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The Atlantic and Summer Pacific waters variability in the Arctic Ocean

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As the main sources of heat for the Arctic Ocean, the Atlantic and Summer Pacific waters and their spatiotemporal variability require serious attention especially in the context of a summer sea ice extent drastic decrease. What we propose here is to examine the recent evolution of these two water masses at a larger spatial extent than what was done so far. For that purpose, we introduce indices to quantify the influence of both the Atlantic and the Summer Pacific waters that proved to be efficient tools to identify these water masses in the Arctic Ocean and to follow their evolution. Based on these indices and thanks to a very large data set collected throughout the Arctic deep basin from 1997 to 2009, we investigate the interannual variability of the Atlantic and Summer Pacific waters distribution and characteristics.
Observations confirm the existence of warm pulses of the Atlantic water mass that propagate into the Arctic basin; however, no warming trend of the Atlantic water in the Eurasian basin is identifiable over the past 12 years. On the contrary, the Summer Pacific water is getting warmer and warmer over the past 12 years and closer to the Lomonosov ridge during the IPY. The Summer Pacific water of the Canadian basin, being closer to the surface and affected by a warming trend, is a better candidate than the Atlantic water to be partly responsible for the summer sea ice extent drastic decrease recently observed in the Arctic and in the Canadian basin in particular.